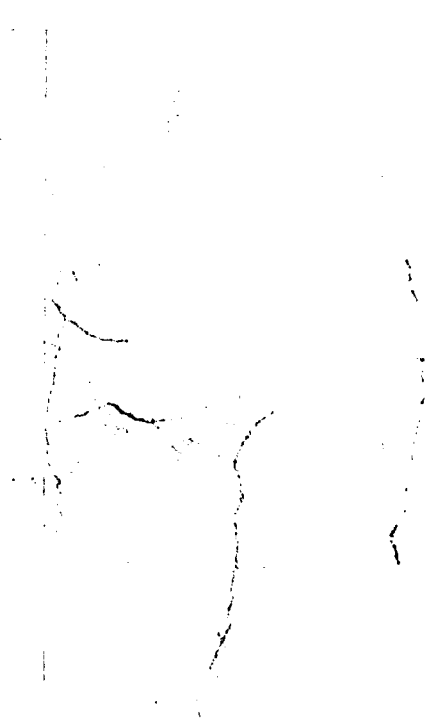MICROCOPY RESOLUTION TEST CHART

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Gordon Conference on Fundamentals of Cybernetics		5. TYPE OF REPORT & PERIOD COVERED Final Report: 1 Aug 84– 31 Oct 84
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Leo Steg		8. CONTRACT OR GRANT NUMBER(s) N00014-84-G-0128
9. PERFORMING ORGANIZATION NAME AND ADDRESS Gordon Research Center University of Rhode Island Kingston, RI 02881		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 61153N 42; RR04209; RR0420902; NR 197-082; DOC # N6822184 RC48044
11. CONTROLLING OFFICE NAME AND ADDRESS Office of Naval Research (Code 442) 800 N. Quincy Street Arlington, VA 22217		12. REPORT DATE 31 Oct 1984
		13. NUMBER OF PAGES 11
14. MONITORING AGENCY NAME & ADDRESS(If different from Controlling Office) Same as above		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

Same as above

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Cybernetics; language, understanding & hermeneutics; transactions in small systems; logic and language of expert systems; information in economic activity; methodology in decision-making and policy formulation.

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

A conference was organized that brought together 110 research scientists of diverse specialities to address a comprehensive review of the relationship of cybernetics to relevant disciplines, including biochemistry, physiology, chemistry & information sciences, and to relevant conceptual areas, including interactive training, organizational autonomy, and policy methodology.

Additional keywords: expert systems, decision making.

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FUNDAMENTALS OF CYBERNETICS

Cybernetics has been defined in many ways since the word was coined in 1950 as meaning "communication and control in the machine and animal (man)" by Norbert Wiener, a famous mathematician.

When combined with some of the less well known ideas from General Systems Theory (i.e. the General Theory of Systems) by Von Bertalanffy, a famous biologist, at about the same time and with the work of a few others afterwards, more descriptive definitions would now include:

* The science of the relationship between people, machines and organizations.

* The expert generalist's approach to his life and the world.

* The bridge between philosophy and science.

* A new program for rigorously handling problems outside the scope of scientific methodology.

* Codifying the "experience" that good high level mangers say they have gained through the years in trying to get organizations and people to function well together.

Nevertheless, Cybernetics being what is is, the applications are certainly there. That is, the road ahead for this fledgling science with its heavy claim as a brand new way to look at the complexities of the world and the people interrelating in it, is bound to be strewn with many new insights amongst the twists and turns.

In view of the above and in the interest of succinctness, I will attempt to list observations to you from the various sessions that are interpreted for applications without elaboration or defending logic. Obviously, this is my own perception and interpretation and there would be many others from others at the conference. This in itself is Cybernetic; but at this level of generality. I believe my comments could be useful to you on a day-to-day basis because of the common characteristics of our backgrounds. Anyone wanting to pursue these points further should contact me and I will attempt to explain further and give references.

1. Session 1 was supposed to cover fundamentals but was really more oriented to the latest theoretical thinking and distinctions. Particularly, it focused on second order Cybernetics (i.e., the nature of the observer) and delved into things like the Characteristics of the relationships and operations between self, paradigm, and one's activities. Information/understanding, self organization, regulation (in a broader sense), requisite variety, etc. were also covered.

Application: It is generally accepted and demonstrated in Cybernetics that not only do viewpoints and deep value systems vary, but that the "facts" are shaped (even created) to fit one's particular paradigm. Thus, the Cybernetician does not say, "This person is not acting rationally based on the facts." Rather, he attempts to find out the value system/ paradigm that..this person is operating with in order to understand what the person sees as "facts" and his appropriate resulting action. Only after he thinks he understands this does the Cybernetician make judgments and try to build understandings between his and other person's paradigm and actions.

2. Session 2 was more second order Cybernetics and got into things like autonomy, objectivity/subjectivity, and the operations of the self in various contexts and distinctions.

Application: People operate on the basis of the coherence of their distinctions and this is represented by their memory (and I believe their conditioning), not some physical manifestations.

3. Session 3 related some of these second order concepts to language and understanding and got into things like the common contexts of language around which meaning occurs.

Application: Understanding with another is never having exactly the same pattern and basis. It is a best fit of some type. As a corollary, knowing the language involved is not necessarily helpful to this best fit, but it may help in the process of trying to understanding.

4. Session 4 was the first one which demonstrated how Cybernetics had actually been used in computerized learning systems for disadvantaged children and with family therapy work by psychologists. (Although some got into a chicken/egg argument about the relationship between the topics and Cybernetics. i.e.,Were they really putting a Cybernetic label on things that had developed by other means?)

Applications: The patterns that connect are the essence of learning.

5. Session 5 got into artificial intelligence and the Cybernetics of the approaches being used. Examples in robotics and used of conversation theory for decisioning in complex situations was described. (The latter approach will be one of the key tools used in the R&D project on cognitive processes, recently launched as an adjunct to the Detailed Control Room Design Review for NMP-1.)

Application: When zeroing in on some specific objective or "bullseye" the aim is not some linear progression of formulation but a matter of identifying the appropriate constraints to stay within while progressing.

6. Session 6 was a discussion of the characteristics of information relative to knowledge, and, together, their impact on economics (as seen by a man who described and practices economic modeling).

2

Application: Managers of economics (and organizations in general) are locked into or constrained by the information sources and the characteristics that they have. In fact, economics (and organizations) can be more fundamentally described and characterized by their information flows (i.e., How they handle it and not just its content).

7. Session 7 was the most applicable, relative to the operation of organizations, but was also the most controversial in focusing on the issue of the theoretical approach to organizational modeling vs. the experimental or data-based approach.

   One of the speakers, Chris Argyris from Harvard, had collected data and information from organizations all over the world and built from it a model that was based on the gaps and misconceptions that exist or are created between people's values, actions and consequences in dealing with each other in organizational contexts. He shows that the results of this discourage risk taking, leaves some important subjects in an "undiscussable" status, creates double binds, leads to self-fulfilling prophecies, etc.

   Ian Mitroff from USC described a process of group consensus decision making that had been developed through much consulting experience for circumstances where the subjects or questions involved are very judgmental and complex. Basically, it involved identification of appropriate stakeholders and rating or graphing their detailed concerns or strategy evaluations under various scenarios. It would be most useful in policy making or determining major shifts in organizational direction.

   Application: Potential applications out of those would be specific use of their approaches to particular cases. I will attempt to obtain publications of the details of their approaches, if anyone wants it. Some key aspects of the latter subject were developed in detail in a class on Cybernetic Methodology that I took while at San Jose State University, and some of these will be used in the HEO/HED assessment program for the NMP-1 DCRDR.

8. Although no publications were handed out at the conference, a reference should be made to one relevant paper: Robb, F. F. (1984) Cybernetics in management thinking. Systems Research, 1 (1), 5-23. It has some excellent discussions which help to fill in the many gaps between the theories and applications. It elaborates in some of the areas discussed at the conference and covers others that I believe Cyberneticians in general would say are important to the operation of organizations.

3

Conference Chairman: Leo Steg, The Brookings Institution
Vice-Chairman: Heinz Von Foerster, University of Illinois (ret.)

Session 1. August 27
Topic: Fundamentals--circularity, process, variety, observation
Chairman: Larry Richards, Colby college, Maine
Principal Speakers:
    1. Heinz Von Foerster, University of Illinois (ret.)
    2. Humberto Maturana, University of Chile
    3. Stuart Umpleby, George Washington University

Session 2. August 27
Topic: Organization, Autonomy, and Autology
Chairman: Milan Zeleny, Fordham University
Principal Speakers:
    1. Francisco Varela, University of Chile
    2. Peter Hejl, University of Siegen, W.Germany
    3. Lars Lofgren, University of Lund, Sweden

Session 3. August 28
Topic: Language, Understanding, and Hermeneutics
Chairman: Ernst von Glasersfeld, University of Georgia
Principal Speakers:
    1. Alton Becker, University of Michigan
    2. Mark Bickhard, University of Texas

Session 4. August 28
Topic: Transaction and Interaction in Small Systems
Chairman: Fred Steier, Philadelphia Child Guidance Clinic
Principal Speakers:
    1. Doreen Steg, Drexel University
    2. Carlos Sluzki, San Francisco General Hospital
    3. Paul Watzlawick, Mental Research Institute

Session 5. August 29
Topic: The Logic and Language of Expert Systems
Chairman: Paul Pangaro, Pangaro Associates
Principal Speakers:
    1. Michael Arbib, University of Massachusetts
    2. Gordon Pask, Concordia University, Montreal

Session 6. August 29
Topic: The Role of Information in Economic Activity
Chairman: Klaus Krippendorff, University of Pennsylvania
Principal Speakers:
    1. Donald Lamberton, University of Queensland
    2. Charles Jonscher, MIT

Session 7. August 30
Topic: Methodology in Decision-making and Policy Formulation
Chairman: John Steinbrunner, Brookings Institution

Principal Speakers:
1. Chris Argyris, Harvard University
2. Ian Mitroff, University of Southern California

Session 8. August 30
Topic: Adaptation in Complex Genetic and Neural Systems
Chairman: Stuart Kauffman, University of Pennsylvania
Principal Speakers:
1. Eugene Yates, UCLA Crump Institute for Medical Research
2. Stephen Grossberg, Boston University

Session 9. August 31
Topic: Cybernetics and Chemistry
Chairman: Rudolph J. Marcus, Office of Naval Research
Principal Speakers:
1. Sam Perone, Lawrence Livermore Laboratory
2. Ray Carhart, Lederle Laboratories

GORDON RESEARCH CONFERENCE
ON
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AT
THE NEW HAMPTON SCHOOL
AUG. 27 - 31, 1984

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